# The diminished capacity to recognize pain expressions among Black individuals appear to be associated with a stringent decision-making criterion rather than a lack of sensitivity to visual cues

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## Context.

Many studies have revealed that the pain expressed by Black people is underestimated. Moreover, a series of studies have shown that White perceivers have a more stringent threshold for detecting pain on Black than on White faces [1-5]. However, those experiments systematically relied on tasks that are sensitive to one's decisional criterion. **This research assessed whether those disparities remain when employing a task that reduces decisional bias. It aimed to investigate the individual contributions of sensitivity and decisional criteria, both being associated with different components of the pain detection process.**

## Methods.

All participants were recruited on *Prolific.*

- Experiment 1 and 2: 50 White participants.
- Experiment 3 and 4: 50 White and 50 Black participants.

## Experiment 1 (decisional bias possible)

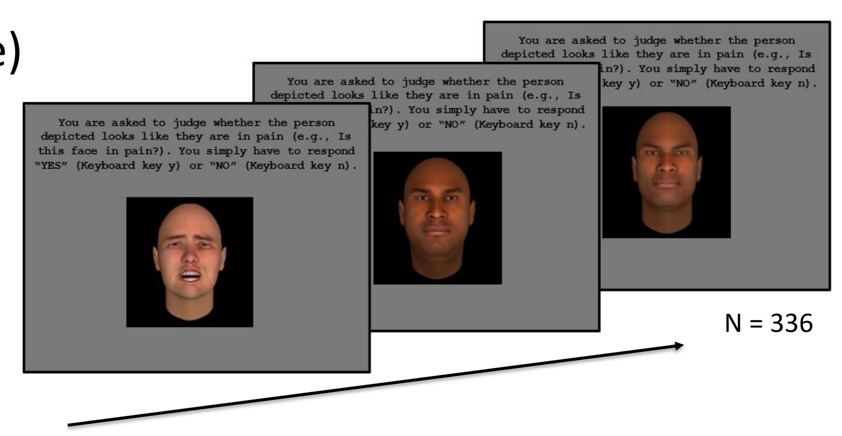
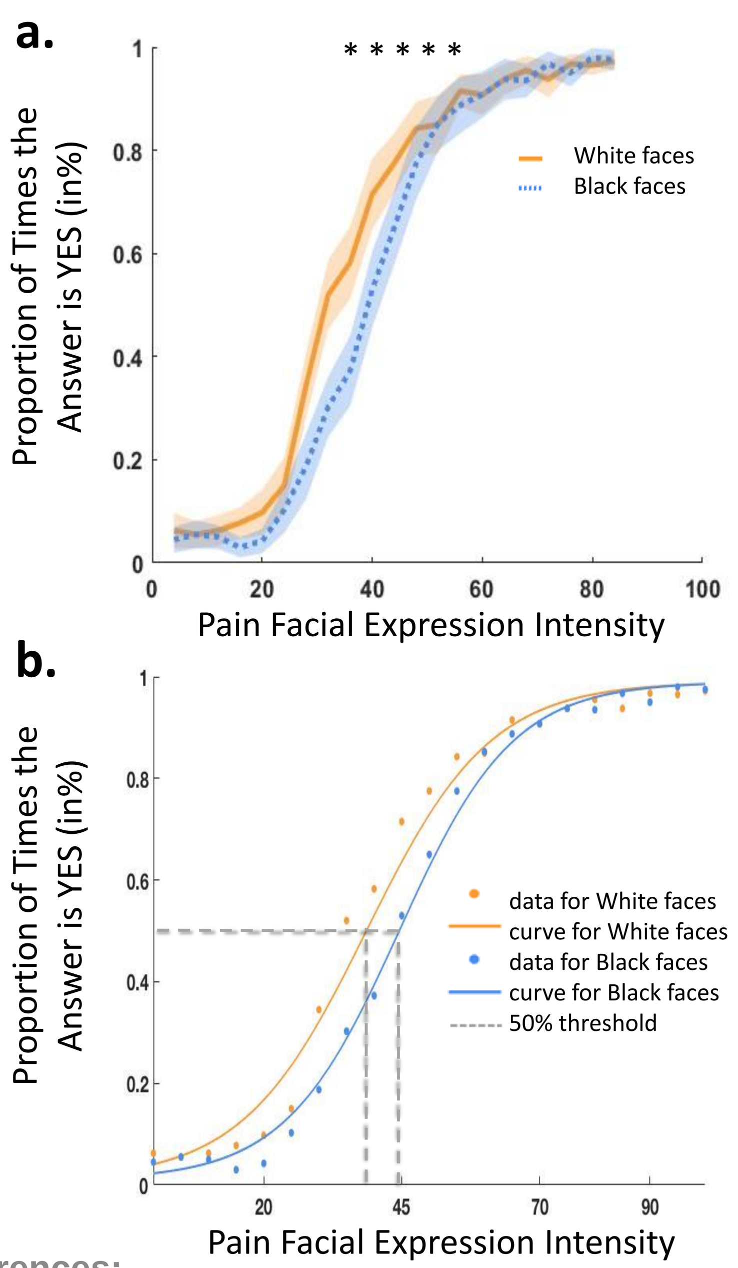



**Figure 1** *Example of a trial in Exp. 1. It involves a yes/no task suggesting the presence of a potential decisional bias. Facial expression intensities are ranging from neutral to 100% with own-race (White) and other-race (Black) faces.*

### Results.




**A repeated measure ANOVA** revealed a main effect of face ethnicity on participant's proportions of pain detection. $F$ (1, 49) = 58.50, $p$ < .001, $\eta^{2p}$ = .54.

A paired sample t test revealed differences in proportion of detection for the intensities of pain ranging between 35% and 55%, $p$ < .001).

**A curve fitting analysis** allowed to calculate the point of subjective equality (PSE, equality at 50%) where the face looked equally neutral and expressing pain.

A 10,000 iterations bootstrap revealed a difference between thresholds for detecting pain on White (M = 38.30%, SD = 1.50%) and on Black faces (M = 44.60%, SD = 1.55%), 95% CI [-1.80, -1.00], $d$ = 4.13.

**Figure 2** *a) Proportion of pain detection across facial expression intensities. Detection of pain facial expression intensity of Black faces is depicted in blue and White faces in orange. Shaded areas represent the 95% confidence intervals. b) Results of the curve fitting. * Intensity levels for which pain detection proportions were significantly different.*

## Experiment 2 (reduced decisional bias)

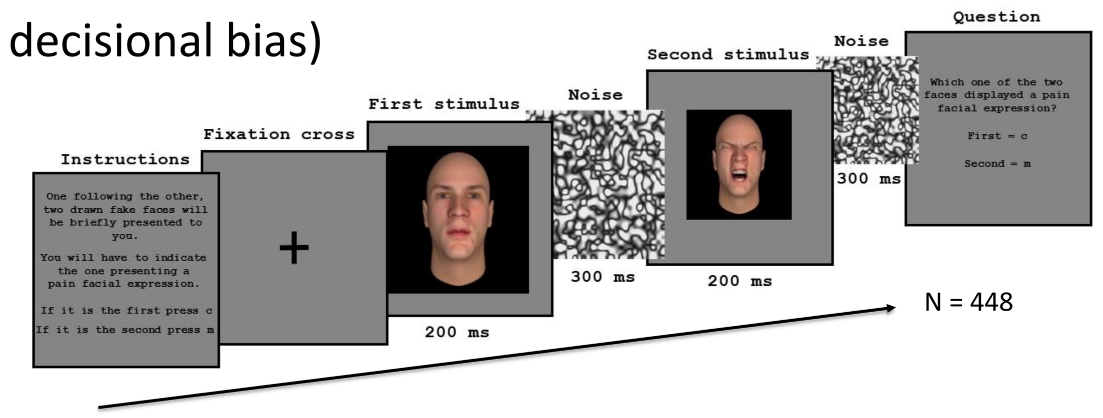
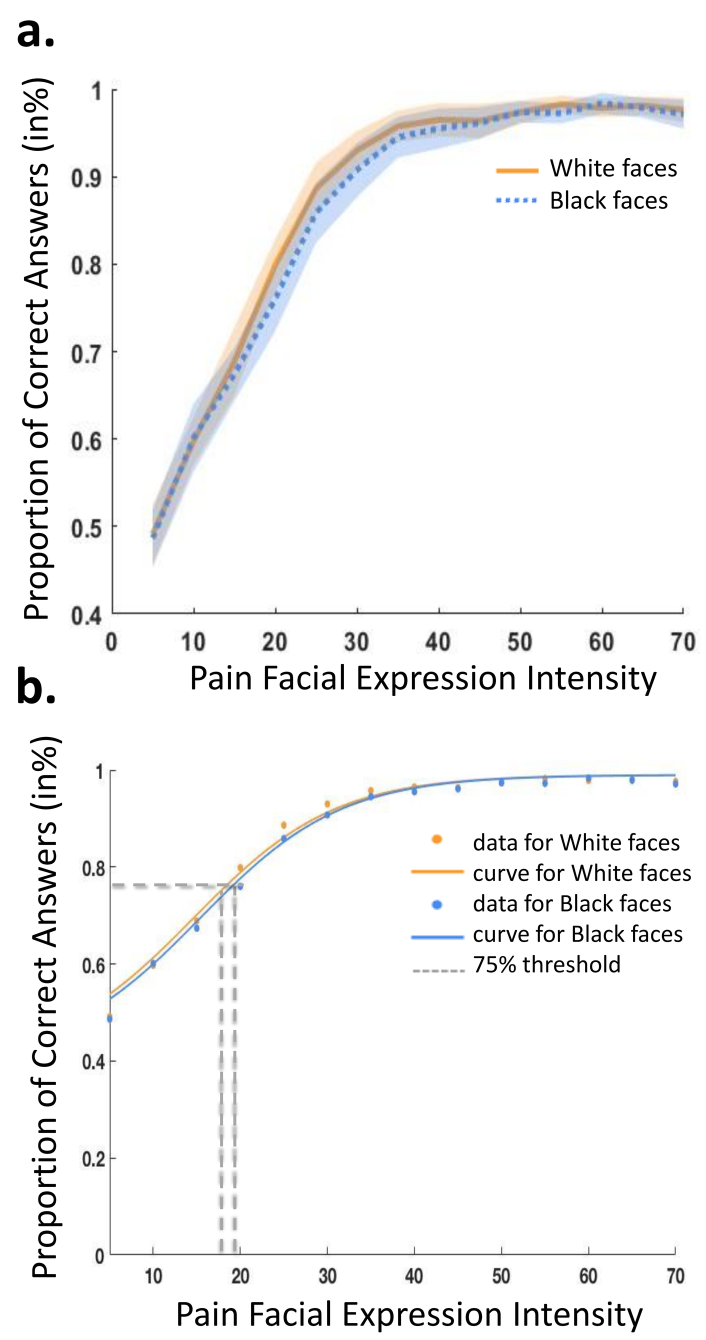



**Figure 3** *Example of a trial in Exp. 2. It employs a 2-IFC task designed to reduce decisional biases and compares neutral expressions to pain facial expressions ranging from 5% to 70% with own-race (White) and other-race (Black).*

### Results.




**A repeated measure ANOVA revealed no significant** effect of ethnicity on participant's proportions of pain detection, $F$ (6.45, 632.50) = 433,68, $p$ < .001, $\eta^{2p}$ = .82.

A Paired sample t test revealed no difference in proportion of pain detection.

**A curve fitting analysis allowed** to calculate the just noticeable difference (JND, at 75%) where neutral face could be distinguished from the pain face at a rate above chance.

A 10,000 iteration bootstrap analysis revealed no significant difference between thresholds for Whites faces (M = 14.95%, SD = .50%) and for Black faces (M = 15,97%, SD = .76%), 95% CI [-0.80, 0.03], $d$ = 1.58.

**Figure 4** *a) Proportion of pain detection across facial expression intensities. Detection of pain facial expression intensity of Black faces is depicted in blue and White faces in orange. Shaded areas represent the 95% confidence intervals. b) Results of the curve fitting. * Intensity levels for which pain detection proportions were significantly different.*

## Experiments 3 and 4

(individual contribution of sensitivity and decisional criteria)

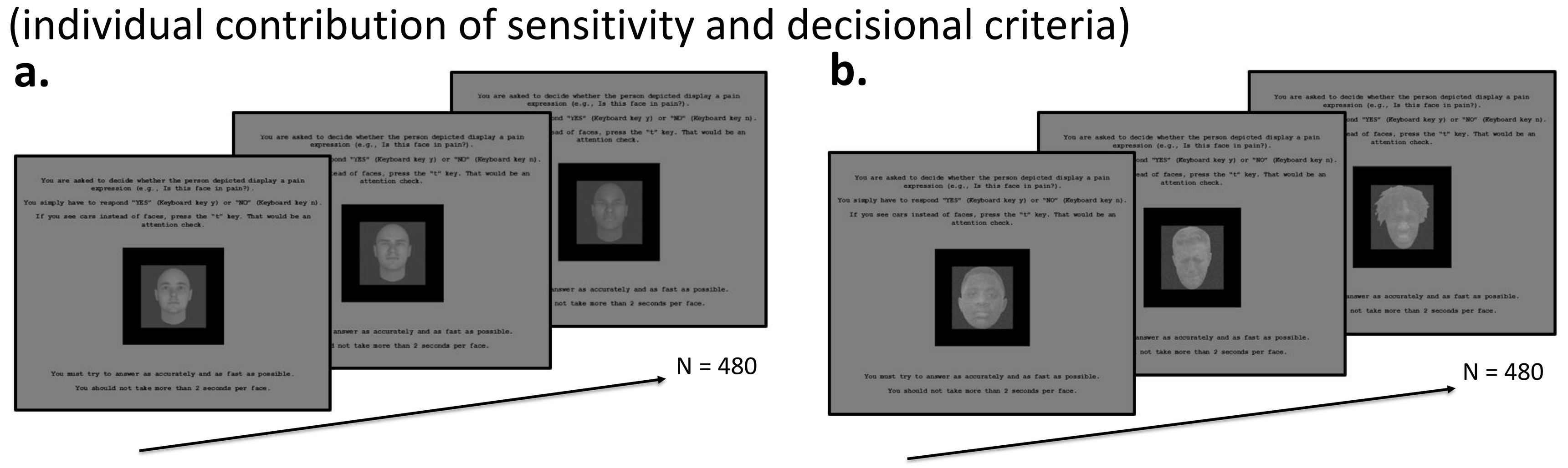



**Figure 5** *Example of a trial in Exp. 3(a) and 4(b). For Exp. 3 and 4, neutral expressions are compared to 54% pain facial expressions, with both own-race and other-race faces. While Exp. 3 displayed the same avatar stimuli used in Exp. 1 and 2, Exp. 4 employed stimuli from the Delaware Pain Database[3]. In both experiments, stimuli were presented in grey scale, with visual noise applied. The inclusion of a black background served to amplify the contrast with the stimuli.*

### Results.

**Paired sample t-tests on the sensitivity index** revealed no significant difference between sensitivity indexes for Black and White faces, for both groups of participants (Exp. 3), but suggests that all participants from Exp. 4 have a larger sensitivity index for Black than for White faces.

**Paired sample t-tests on the decision criteria** revealed that Black and White participants of both Exp. 3 and 4 have a larger criteria for Black than for White faces.

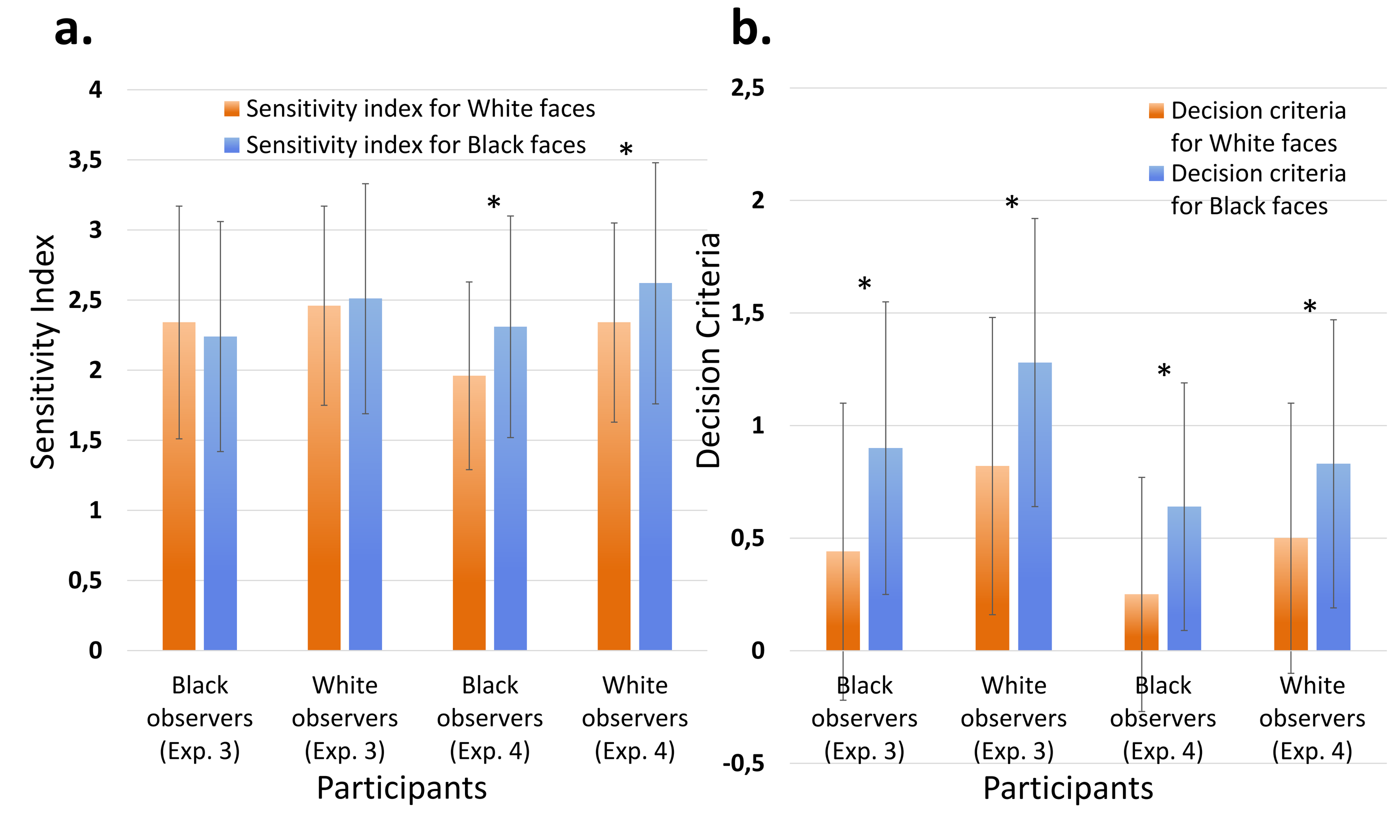



**Figure 6** *a) Paired sample t-tests on the sensitivity indexes for Exp. 3 and 4. b) Paired sample t-tests on the decision criteria for Exp. 3 and 4. Scores for Black faces are depicted in blue while those for the White faces are presented in orange. Error bars = standard deviation. * Significant difference between scores for Black and White faces.*

## Conclusion.

- A systematic ethnic bias is observed in the decisional criterion used to decide if a face is in pain or not.
- Both groups of participants applied a more stringent criterion to deem a Black face in pain.
- Differences in terms of sensitivity were observed, yet less robust across experiments and analyses approaches.
- When differences in terms of sensitivity were found, they pointed towards a better sensitivity to pain signal in Black than in White faces.
- Individuals who succeed at extracting pain facial information from Black faces, while maintaining a stringent criteria, should be trained for unbiased detection of pain expressions, regardless of ethnicity which could ultimately help prevent disparities in pain treatment.

References:

Chaires de recherche du Canada | Canada Research Chairs | SSHRC CRSH | UQO | UQÀM | GNS | LPVS-UQO | lpvs-uqo.ca